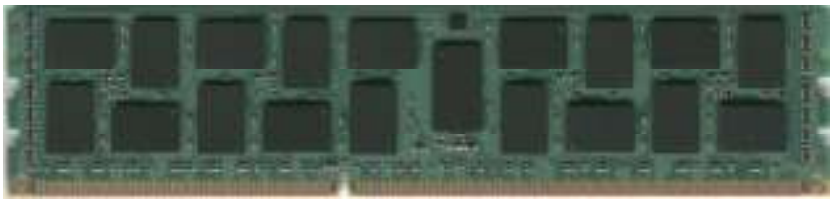
DTM64340A

8GB - 240-Pin 2Rx4 Registered ECC LV DDR3 DIMM



Identification

DTM64340A 1Gx72

8GB 2Rx4 PC3L-10600R-9-11-E2

Performance range

Clock / Module Speed / CL-t_{RCD} -t_{RP}

667 MHz / PC3L-10600 / 9-9-9

533 MHz / PC3L-8500 / 8-8-8

533 MHz / PC3L-8500 / 7-7-7

400 MHz / PC3L-6400 / 6-6-6

Features

- 240-pin JEDEC-compliant DIMM, 133.35 mm wide by 30 mm high
- Operating Voltage: VDD = VDDQ = +1.35V (1.283V to 1.45V)
- Backward-compatible to VDD = VDDQ = +1.5V ±0.075V
- On-board I^2C temperature sensor with integrated Serial Presence-Detect (SPD) EEPROM
- Data Transfer Rate: 10.6 Gigabytes/sec
- Data Bursts: 8 and burst chop 4 mode
- ZQ Calibration for Output Driver and On-Die Termination (ODT)
- Programmable ODT / Dynamic ODT during Writes
- Programmable CAS Latency: 6, 7, 8 and 9
- Bi-directional Differential Data Strobe signals
- SDRAM Addressing (Row/Col/Bank): 15/11/3
- Fully RoHS Compliant

Description

DTM64340A is a registered 1Gx72 memory module, which conforms to JEDEC's DDR3, PC3L-10600 standard. The assembly is Dual-Rank. Each Rank is comprised of eighteen 512Mx4 DDR3-1333 Samsung SDRAMs. One 2K-bit EEPROM is used for Serial Presence Detect and a combination register/PLL, with Address and Command Parity, is also used.

Both output driver strength and input termination impedance are programmable to maintain signal integrity on the I/O signals in a Fly-by topology. A thermal sensor accurately monitors the DIMM module and can prevent exceeding the maximum operating temperature of 95C.

Pin Configuration

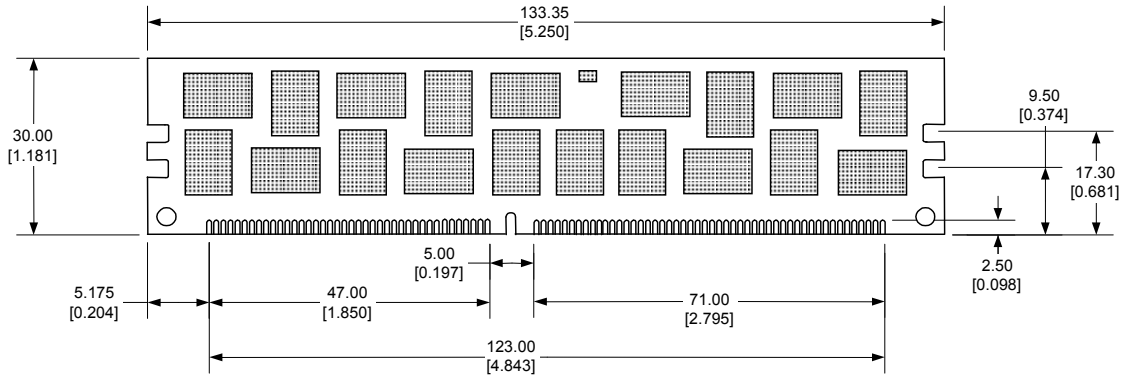
Front Side				Back Side			
1 V_{REFDQ}	31 DQ25	61 A2	91 DQ41	121 V_{SS}	151 V_{SS}	181 A1	211 V_{SS}
2 V_{SS}	32 V_{SS}	62 V_{DD}	92 V_{SS}	122 DQ4	152 DQS12	182 V_{DD}	212 DQS14
3 DQ0	33 /DQS3	63 CK1*	93 /DQS5	123 DQ5	153 /DQS12	183 V_{DD}	213 /DQS14
4 DQ1	34 DQS3	64 /CK1*	94 DQS5	124 V_{SS}	154 V_{SS}	184 CK0	214 V_{SS}
5 V_{SS}	35 V_{SS}	65 V_{DD}	95 V_{SS}	125 DQS9	155 DQ30	185 /CK0	215 DQ46
6 /DQS0	36 DQ26	66 V_{DD}	96 DQ42	126 /DQS9	156 DQ31	186 V_{DD}	216 DQ47
7 DQS0	37 DQ27	67 V_{REFCA}	97 DQ43	127 V_{SS}	157 V_{SS}	187 /EVENT	217 V_{SS}
8 V_{SS}	38 V_{SS}	68 P_{AR_IN}	98 V_{SS}	128 DQ6	158 CB4	188 A0	218 DQ52
9 DQ2	39 CB0	69 VDD	99 DQ48	129 DQ7	159 CB5	189 V_{DD}	219 DQ53
10 DQ3	40 CB1	70 A10/AP	100 DQ49	130 V_{SS}	160 V_{SS}	190 BA1	220 V_{SS}
11 V_{SS}	41 V_{SS}	71 BA0	101 V_{SS}	131 DQ12	161 DQS17	191 V_{DD}	221 DQS15
12 DQ8	42 /DQS8	72 V_{DD}	102 /DQS6	132 DQ13	162 /DQS17	192 /RAS	222 /DQS15
13 DQ9	43 DQS8	73 /WE	103 DQS6	133 V_{SS}	163 V_{SS}	193 /S0	223 V_{SS}
14 V_{SS}	44 V_{SS}	74 /CAS	104 V_{SS}	134 DQS10	164 CB6	194 V_{DD}	224 DQ54
15 /DQS1	45 CB2	75 V_{DD}	105 DQ50	135 /DQS10	165 CB7	195 ODT0	225 DQ55
16 DQS1	46 CB3	76 /S1	106 DQ51	136 V_{SS}	166 V_{SS}	196 A13	226 V_{SS}
17 V_{SS}	47 V_{SS}	77 ODT1	107 V_{SS}	137 DQ14	167 NC (TEST)	197 V_{DD}	227 DQ60
18 DQ10	48 V_{TT}	78 V_{DD}	108 DQ56	138 DQ15	168 /RESET	198 /S3, NC	228 DQ61
19 DQ11	49 V_{TT}	79 /S2, NC	109 DQ57	139 V_{SS}	169 CKE1	199 V_{SS}	229 V_{SS}
20 V_{SS}	50 CKE0	80 V_{SS}	110 V_{SS}	140 DQ20	170 V_{DD}	200 DQ36	230 DQS16
21 DQ16	51 V_{DD}	81 DQ32	111 /DQS7	141 DQ21	171 A15	201 DQ37	231 /DQS16
22 DQ17	52 BA2	82 DQ33	112 DQS7	142 V_{SS}	172 A14	202 V_{SS}	232 V_{SS}
23 V_{SS}	53 $/E_{RR}_O_{UT}$	83 V_{SS}	113 V_{SS}	143 DQS11	173 V_{DD}	203 DQS13	233 DQ62
24 /DQS2	54 V_{DD}	84 /DQS4	114 DQ58	144 /DQS11	174 A12/BC	204 /DQS13	234 DQ63
25 DQS2	55 A11	85 DQS4	115 DQ59	145 V_{SS}	175 A9	205 V_{SS}	235 V_{SS}
26 V_{SS}	56 A7	86 V_{SS}	116 V_{SS}	146 DQ22	176 V_{DD}	206 DQ38	236 V_{DDSPD}
27 DQ18	57 V_{DD}	87 DQ34	117 SA0	147 DQ23	177 A8	207 DQ39	237 SA1
28 DQ19	58 A5	88 DQ35	118 SCL	148 V_{SS}	178 A6	208 V_{SS}	238 SDA
29 V_{SS}	59 A4	89 V_{SS}	119 SA2	149 DQ28	179 V_{DD}	209 DQ44	239 V_{SS}
30 DQ24	60 V_{DD}	90 DQ40	120 V_{TT}	150 DQ29	180 A3	210 DQ45	240 V_{TT}

* Not used

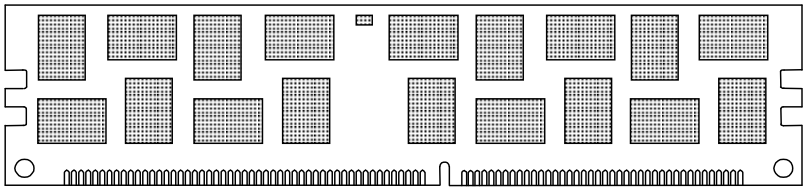
Pin Description

Name	Function
CB[7:0]	Data Check Bits
DQ[63:0]	Data Bits
DQS[17:0], /DQS[17:0]	Differential Data Strobes
CK[1:0], /CK[1:0]	Differential Clock Inputs
CKE[1:0]	Clock Enables
/CAS	Column Address Strobe
/RAS	Row Address Strobe
/S[3:0]	Chip Selects
/WE	Write Enable
A[15:0]	Address Inputs
BA[2:0]	Bank Addresses
ODT[1:0]	On Die Termination Inputs
SA[2:0]	SPD Address
SCL	SPD Clock Input
SDA	SPD Data Input/Output
/EVENT	Temperature Sensing
/RESET	Reset for register and DRAMs
PAR_IN	Parity bit for Addr/Ctrl
/ERR_OUT	Error bit for Parity Error
A12/BC	Combination input: Addr12/Burst Chop
A10/AP	Combination input: Addr10/Auto-precharge
V_{SS}	Ground
V_{DD}	Power
V_{DDSPD}	SPD EEPROM Power
V_{REFDQ}	Reference Voltage for DQ's
V_{REFCA}	Reference Voltage for CA
V_{TT}	Termination Voltage
NC	No Connection

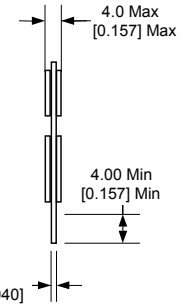
Front view



Back view



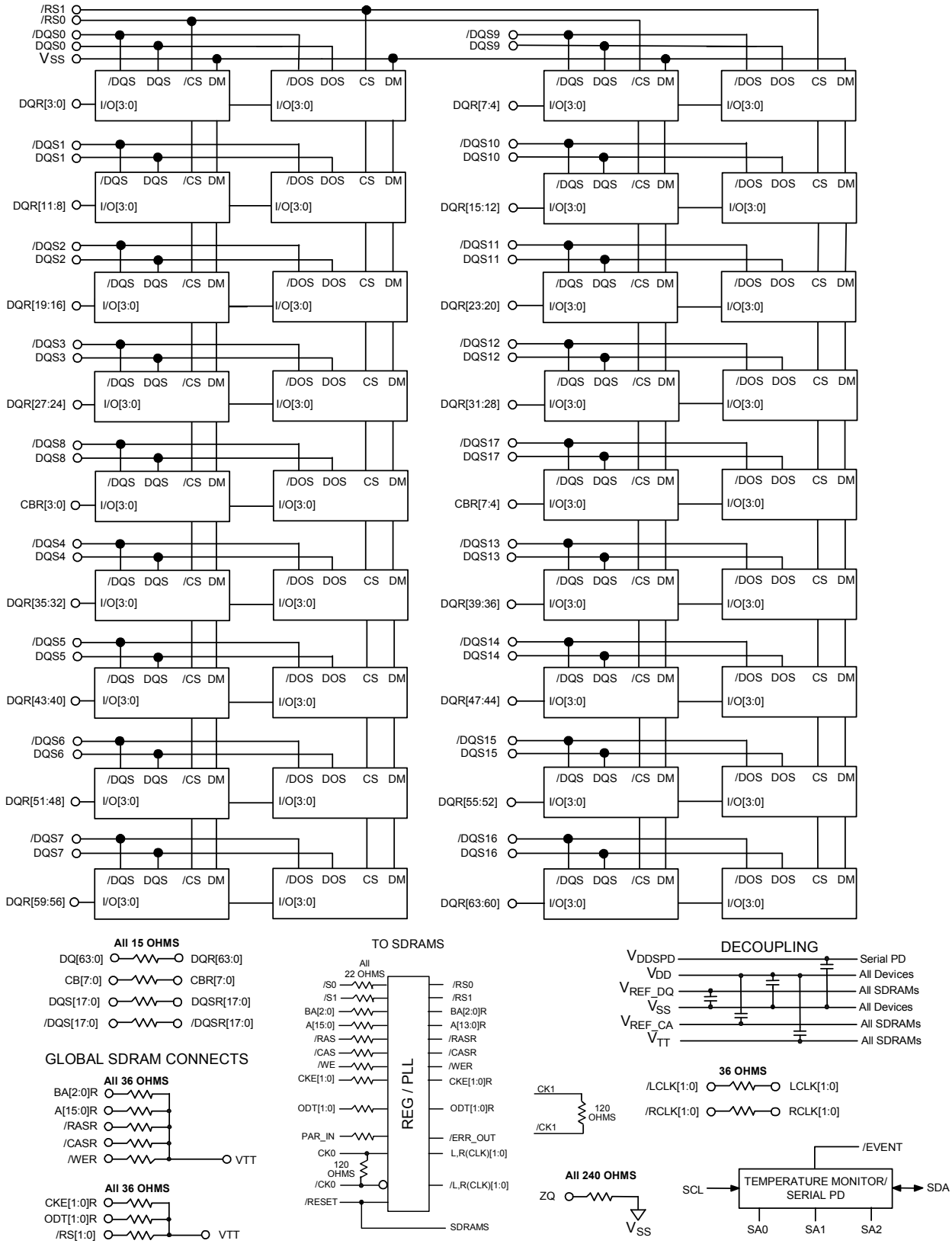
Side view



Notes

Tolerances on all dimensions except where otherwise indicated are ±.13 (.005).

All dimensions are expressed: millimeters [inches]


/RS1
/RS0
/DQS0
DQS0
VSS
/DQS9
DQS9
/DQS DQS /CS DM
/DOS DOS CS DM
DQR[3:0]
DQR[7:4]
I/O[3:0]
/DQS1
DQS1
/DQS10
DQS10
DQR[11:8]
DQR[15:12]
/DQS2
DQS2
/DQS11
DQS11
DQR[19:16]
DQR[23:20]
/DQS3
DQS3
/DQS12
DQS12
DQR[27:24]
DQR[31:28]
/DQS8
DQS8
/DQS17
DQS17
CBR[3:0]
CBR[7:4]
/DQS4
DQS4
/DQS13
DQS13
DQR[35:32]
DQR[39:36]
/DQS5
DQS5
/DQS14
DQS14
DQR[43:40]
DQR[47:44]
/DQS6
DQS6
/DQS15
DQS15
DQR[51:48]
DQR[55:52]
/DQS7
DQS7
/DQS16
DQS16
DQR[59:56]
DQR[63:60]

All 15 OHMS
DQ[63:0]
DQR[63:0]
CB[7:0]
CBR[7:0]
DQS[17:0]
DQSR[17:0]
/DQS[17:0]
/DQSR[17:0]

GLOBAL SDRAM CONNECTS
All 36 OHMS
BA[2:0]R
A[15:0]R
/RASR
/CASR
/WER
VTT
All 36 OHMS
CKE[1:0]R
ODT[1:0]R
/RS[1:0]
VTT

TO SDRAMS
All
22 OHMS
/S0
/S1
BA[2:0]
A[15:0]
/RAS
/CAS
/WE
CKE[1:0]
ODT[1:0]
PAR_IN
CK0
120
OHMS
/CK0
/RESET
REG / PLL
/RS0
/RS1
BA[2:0]R
A[13:0]R
/RASR
/CASR
/WER
CKE[1:0]R
ODT[1:0]R
/ERR_OUT
L,R(CLK)[1:0]
/L,R(CLK)[1:0]
SDRAMS

CK1
120
OHMS
/CK1

All 240 OHMS
ZQ
VSS

DECOUPLING
VDDSPD
Serial PD
VDD
All Devices
VREF_DQ
All SDRAMs
VSS
All Devices
VREF_CA
All SDRAMs
VTT
All SDRAMs

36 OHMS
/LCLK[1:0]
LCLK[1:0]
/RCLK[1:0]
RCLK[1:0]

/EVENT
SCL
TEMPERATURE MONITOR/
SERIAL PD
SDA
SA0
SA1
SA2

Absolute Maximum Ratings

(Note: Operation at or above Absolute Maximum Ratings can adversely affect module reliability.)

PARAMETER	Symbol	Minimum	Maximum	Unit
Temperature, non-Operating	$T_{STORAGE}$	-55	100	C
Ambient Temperature, Operating	T_A	0	70	C
DRAM Case Temperature, Operating	T_{CASE}	0	95	C
Voltage on V_{DD} relative to V_{SS}	V_{DD}	-0.4	1.975	V
Voltage on Any Pin relative to V_{SS}	V_{IN},V_{OUT}	-0.4	1.975	V

Notes:

DRAM Operating Case Temperature above 85C requires 2X refresh.

Recommended DC Operating Conditions (T_A = 0 to 70 C, Voltage referenced to V_{ss} = 0 V)

PARAMETER	Symbol	Operation Voltage	Minimum	Typical	Maximum	Unit	Note
Power Supply Voltage	V_{DD}	1.35V	1.283	1.35	1.4500	V	
		1.5V	1.425	1.5	1.575		
I/O Reference Voltage	V_{REFDQ}	1.35V	0.49 V_{DD}	0.50 V_{DD}	0.51 V_{DD}	V	1
		1.5V					
I/O Reference Voltage	V_{REFCA}	1.35V	0.49 V_{DD}	0.50 V_{DD}	0.51 V_{DD}	V	1
		1.5V					

Notes:

1) The value of V_{REF} is expected to equal one-half V_{DD} and to track variations in the V_{DD} DC level. Peak-to-peak noise on V_{REF} may not exceed ±1% of its DC value.

DC Input Logic Levels, Single-Ended (T_A = 0 to 70 C, Voltage referenced to V_{ss} = 0 V)

PARAMETER	Symbol	Operation Voltage	Minimum	Maximum	Unit
Logical High (Logic 1)	$V_{IH(DC)}$	1.35V	V_{REF} + 0.09	V_{DD}	V
		1.5V	V_{REF} + 0.1	V_{DD}	
Logical Low (Logic 0)	$V_{IL(DC)}$	1.35V	V_{SS}	V_{REF} - 0.09	V
		1.5V	V_{SS}	V_{REF} - 0.1	

AC Input Logic Levels, Single-Ended (T_A = 0 to 70 C, Voltage referenced to V_{ss} = 0 V)

PARAMETER	Symbol	Operation Voltage	Minimum	Maximum	Unit
Logical High (Logic 1)	$V_{IH(AC)}$	1.35V	V_{REF} + 0.160	-	V
		1.5V	V_{REF} + 0.175	-	
Logical Low (Logic 0)	$V_{IL(AC)}$	1.35V	-	V_{REF} - 0.160	V
		1.5V	-	V_{REF} - 0.175	

Differential Input Logic Levels (T_A = 0 to 70 C, Voltage referenced to V_{ss} = 0 V)

PARAMETER	Symbol	Minimum	Maximum	Unit
Differential Input Logic High	$V_{IH.DIFF}$	+0.200	DC:V_{DD} AC:V_{DD}+0.4	V
Differential Input Logic Low	$V_{IL.DIFF}$	DC:V_{SS} AC:V_{SS}-0.4	-0.200	V
Differential Input Cross Point Voltage relative to VDD/2	V_{IX}	- 0.150	+ 0.150	V

Capacitance (T_A = 25 C, f = 100 MHz)

PARAMETER	Pin	Symbol	Minimum	Maximum	Unit
Input Capacitance, Clock	CK0, /CK0	C_{CK}	2	3	pF
Input Capacitance, Address	BA[2:0], A[15:0], /RAS, /CAS, /WE	C_I	1.5	2.5	pF
Input Capacitance Control	/S[1:0], CKE[1:0], ODT[1:0]	C_I	1.5	2.5	pF
Input/Output Capacitance	DQ[63:0], CB[7:0] DQS[17:0], /DQS[17:0].	C_{IO}	3	5	pF

DC Characteristics (T_A = 0 to 70 C, Voltage referenced to V_{ss} = 0 V)

PARAMETER	Symbol	Minimum	Maximum	Unit	Note
Input Leakage Current (Any input 0 V < VIN < VDD)	I_{IL}	-18	+18	µA	1,2
Output Leakage Current (0V < VOUT < VDDQ)	I_{OL}	-10	+10	µA	2,3

Notes:
1) All other pins not under test = 0 V
2) Values are shown per pin
3) DQ, DQS, DQS and ODT are disabled

I_{DD} Specifications and Conditions (T_A = 0 to 70 C, Voltage referenced to V_{ss} = 0 V)

PARAMETER	Symbol	Test Condition	Max Value		Unit
			1.35V	1.5V	
Operating One Bank Active-Precharge Current	$I_{DD}0$*	Operating current : One bank ACTIVATE-to-PRECHARGE	1520	1750	mA
Operating One Bank Active-Read-Precharge Current	$I_{DD}1$*	Operating current : One bank ACTIVATE-to-READ-to-PRECHARGE	1702	1930	mA
Precharge Power-Down Current	$I_{DD}2P$	Precharge power down current: (Slow exit)	900	1012	mA
Precharge Power-Down Current	$I_{DD}2P$	Precharge power down current: (Fast exit)	1008	1120	mA
Precharge Quiet Standby Current	$I_{DD}2Q$	Precharge quiet standby current	1130	1350	mA
Precharge Standby Current	$I_{DD}2N$	Precharge standby current	1140	1370	mA
Active Power-Down Current	$I_{DD}3P$	Active power-down current	1080	1192	mA
Active Standby Current	$I_{DD}3N$	Active standby current	1500	1900	mA
Operating Burst Write Current	$I_{DD}4W$*	Burst write operating current	2070	2300	mA
Operating Burst Read Current	$I_{DD}4R$*	Burst read operating current	1970	2110	mA
Burst Refresh Current	$I_{DD}5$*	Refresh current	2940	3070	mA
Self Refresh Current	$I_{DD}6$	Self-refresh temperature current: MAX T_C = 85°C	390	462	mA
Operating Bank Interleave Read Current	$I_{DD}7$*	All bank interleaved read current	3050	3280	mA

* One module rank in this operation the rest in IDD2N.

AC Operating Conditions

PARAMETER	Symbol	Min	Max	Unit
Internal read command to first data	t_{AA}	13.125	20	ns
CAS-to-CAS Command Delay	t_{CCD}	4	-	t_{CK}
Clock High Level Width	$t_{CH(avg)}$	0.47	0.53	t_{CK}
Clock Cycle Time	t_{CK}	1.5	1.875	ns
Clock Low Level Width	$t_{CL(avg)}$	0.47	0.53	t_{CK}
Data Input Hold Time after DQS Strobe	t_{DH}	65	-	ps
DQ Input Pulse Width	t_{DIPW}	400	-	ps
DQS Output Access Time from Clock	t_{DQSCK}	-255	+255	ps
Write DQS High Level Width	t_{DQSH}	0.45	0.55	$t_{CK(avg)}$
Write DQS Low Level Width	t_{DQSL}	0.45	0.55	$t_{CK(avg)}$
DQS-Out Edge to Data-Out Edge Skew	t_{DQSQ}	-	125	ps
Data Input Setup Time Before DQS Strobe	t_{DS}	30	-	ps
DQS Falling Edge from Clock, Hold Time	t_{DSH}	0.2	-	$t_{CK(avg)}$
DQS Falling Edge to Clock, Setup Time	t_{DSS}	0.2	-	$t_{CK(avg)}$
Clock Half Period	t_{HP}	minimum of t_{CH} or t_{CL}	-	ns
Address and Command Hold Time after Clock	t_{IH}	140	-	ps
Address and Command Setup Time before Clock	t_{IS}	65	-	ps
Load Mode Command Cycle Time	t_{MRD}	4	-	t_{CK}
DQ-to-DQS Hold	t_{QH}	0.38	-	$t_{CK(avg)}$
Active-to-Precharge Time	t_{RAS}	36	$9*t_{REFI}$	ns
Active-to-Active / Auto Refresh Time	t_{RC}	49.125	-	ns
RAS-to-CAS Delay	t_{RCD}	13.125	-	ns
Average Periodic Refresh Interval 0^{o} C $\leq T_{CASE} < 85^{o}$ C	t_{REFI}	-	7.8	µs
Average Periodic Refresh Interval 0^{o} C $\leq T_{CASE} < 95^{o}$ C	t_{REFI}	-	3.9	µs
Auto Refresh Row Cycle Time	t_{RFC}	160	-	ns
Row Precharge Time	t_{RP}	13.125	-	ns
Read DQS Preamble Time	t_{RPRE}	0.9	Note-1	$t_{CK(avg)}$
Read DQS Postamble Time	t_{RPST}	0.3	Note-2	$t_{CK(avg)}$
Row Active to Row Active Delay	t_{RRD}	Max(4nCK, 6ns)	-	ns
Internal Read to Precharge Command Delay	t_{RTP}	Max(4nCK, 7.5ns)	-	ns
Write DQS Preamble Setup Time	t_{WPRE}	0.9	-	$t_{CK(avg)}$
Write DQS Postamble Time	t_{WPST}	0.3	-	$t_{CK(avg)}$
Write Recovery Time	t_{WR}	15	-	ns
Internal Write to Read Command Delay	t_{WTR}	Max(4nCK, 7.5ns)	-	ns

Notes:
1. The maximum preamble is bound by tLZDQS(min)
2. The maximum postamble is bound by tHZDQS(max)

Serial Presence Detect

Byte#	Function.	Value	Hex
0	Number of Bytes Used / Number of Bytes in SPD Device / CRC Coverage.		0x92
	Bit 3 ~ Bit 0. SPD Bytes Used -	176	
	Bit 6 ~ Bit 4. SPD Bytes Total -	256	
	Bit 7. CRC Coverage -	Bytes 0-116	
1	SPD Revision.	Rev. 1.1	0x11
2	Key Byte / DRAM Device Type.	DDR3 SDRAM	0x0B
3	Key Byte / Module Type.		0x01
	Bit 3 ~ Bit 0. Module Type -	RDIMM	
	Bit 7 ~ Bit 4. Reserved -	0	
4	SDRAM Density and Banks.		0x03
	Bit 3 ~ Bit 0. Total SDRAM capacity, in megabits -	2Gb	
	Bit 6 ~ Bit 4. Bank Address Bits -	8 banks	
	Bit 7. Reserved -	0	
5	SDRAM Addressing.		0x1A
	Bit 2 ~ Bit 0. Column Address Bits -	11	
	Bit 5 ~ Bit 3. Row Address Bits -	15	
	Bit 7, 6. Reserved	0	
6	Module Nominal Voltage, VDD.		0x02
	Bit 0. NOT 1.5 V operable -		
	Bit 1. 1.35 V operable -	X	
	Bit 2. 1.2X V operable -		
	Bit 3. Reserved -		
	Bit 4. Reserved -		
	Bit 5. Reserved -		
	Bit 6. Reserved -		
	Bit 7. Reserved -		
7	Module Organization.		0x08
	Bit 2 ~ Bit 0. SDRAM Device Width -	4-Bits	
	Bit 5 ~ Bit 3. Number of Ranks -	2-Rank	
	Bit 7, 6. Reserved	0	
8	Module Memory Bus Width.		0x0B
	Bit 2 ~ Bit 0. Primary bus width, in bits -	64-Bits	
	Bit 4, Bit 3. Bus width extension, in bits -	8-Bits	
	Bit 7 ~ Bit 5. Reserved -	0	
9	Fine Timebase (FTB) Dividend / Divisor.		0x11
	Bit 3 ~ Bit 0. Fine Timebase (FTB) Divisor	1	
	Bit 7 ~ Bit 4. Fine Timebase (FTB) Dividend	1	
10	Medium Timebase (MTB) Dividend.	1 (MTB = 0.125ns)	0x01

11	Medium Timebase (MTB) Divisor.	8 (MTB = 0.125ns)	0x08
12	SDRAM Minimum Cycle Time (tCKmin).	1.5ns	0x0C
13	Reserved.	UNUSED	0x00
14	CAS Latencies Supported, Least Significant Byte.		0x3C
	Bit 0. CL = 4 -		
	Bit 1. CL = 5 -		
	Bit 2. CL = 6 -	X	
	Bit 3. CL = 7 -	X	
	Bit 4. CL = 8 -	X	
	Bit 5. CL = 9 -	X	
	Bit 6. CL = 10 -		
	Bit 7. CL = 11 -		
15	CAS Latencies Supported, Most Significant Byte.		0x00
	Bit 0. CL = 12 -		
	Bit 1. CL = 13 -		
	Bit 2. CL =14 -		
	Bit 3. CL = 15 -		
	Bit 4. CL = 16 -		
	Bit 5. CL = 17 -		
	Bit 6. CL = 18 -		
	Bit 7. Reserved.		
16	Minimum CAS Latency Time (tAAmin).	13.125ns	0x69
17	Minimum Write Recovery Time (tWRmin).	15.0ns	0x78
18	Minimum RAS# to CAS# Delay Time (tRCDmin).	13.125ns	0x69
19	Minimum Row Active to Row Active Delay Time (tRRDmin).	6.0ns	0x30
20	Minimum Row Precharge Delay Time (tRPmin).	13.125ns	0x69
21	Upper Nibbles for tRAS and tRC.		0x11
	Bit 3 ~ Bit 0. tRAS Most Significant Nibble -	1	
	Bit 7 ~ Bit 4. tRC Most Significant Nibble -	1	
22	Minimum Active to Precharge Delay Time (tRASmin), Least Significant Byte.	36.0ns	0x20
23	Minimum Active to Active/Refresh Delay Time (tRCmin), Least Significant Byte.	49.125ns	0x89
24	Minimum Refresh Recovery Delay Time (tRFCmin), Least Significant Byte.	160.0ns	0x00
25	Minimum Refresh Recovery Delay Time (tRFCmin), Most Significant Byte.	160.0ns	0x05
26	Minimum Internal Write to Read Command Delay Time (tWTRmin).	7.5ns	0x3C
27	Minimum Internal Read to Precharge Command Delay Time (tRTPmin).	7.5ns	0x3C

28	Upper Nibble for tFAW.		0x00
	Bit 3 ~ Bit 0. tFAW Most Significant Nibble -	0	
	Bit 7 ~ Bit 4. Reserved -	0	
29	Minimum Four Activate Window Delay Time (tFAWmin), Least Significant Byte.	30.0ns	0xF0
30	SDRAM Optional Features.		0x83
	Bit 0. RZQ / 6 -	X	
	Bit 1. RZQ / 7 -	X	
	Bit 6 ~ Bit 2. Reserved -		
	Bit 7. DLL-Off Mode Support		
31	SDRAM Drivers Supported.		0x01
	Extended Temperature Range -	X	
	Extended Temperature Refresh Rate -		
	Auto Self Refresh (ASR) -		
	On-die Thermal Sensor (ODTS) Readout -		
	Reserved -		
	Reserved -		
	Reserved -		
	Partial Array Self Refresh (PASR) -		
32	Module Thermal Sensor.		0x80
	Bit 6 ~ Bit 0. Thermal Sensor Accuracy -	0	
	Bit 7. Thermal Sensor -	With TS	
33	SDRAM Device Type.		0x00
	Bit 6 ~ Bit 0. Non-Standard Device Description -	0	
	Bit 7. SDRAM Device Type -	Std Mono	
34-59	Reserved	UNUSED	0x00
60	Module Nominal Height.		0x0F
	Bit 4 ~ Bit 0. Module Nominal Height max, in mm -	29<h<=30	
	Bit 7 ~ Bit5. Reserved -	0	
61	Module Maximum Thickness.		0x11
	Bit 3 ~ Bit 0. Front, in mm (baseline thickness = 1 mm) -	1<th<=2	
	Bit 7 ~ Bit 4. Back, in mm (baseline thickness = 1 mm) -	1<th<=2	
62	Reference Raw Card Used.		0x44
	Bit 4 ~ Bit 0. Reference Raw Card -	R/C E	
	Bit 6, Bit 5. Reference Raw Card Revision -	Rev.2	
	Bit 7. Reserved -	0	
63	(Registered) DIMM Module Attributes.		0x09
	Bit 1 ~ Bit 0. # of Registers used on RDIMM -	1 Register	
	Bit 3 ~ Bit 2. # of Rows of DRAMs on RDIMM -	2 Rows	
	Bit 7 ~ Bit 4. Reserved -	0	

64	RDIMM Thermal Heat Spreader Solution.		0x00
	Bit 6 ~ Bit 0. Heat Spreader Thermal Characteristics -	0	
	Bit 7. Heat Spreader Solution -	No HS	
65	Register Manufacturer ID Code, Least Significant Byte (Optional).		0x80
66	Register Manufacturer ID Code, Most Significant Byte (Optional).		0xB3
67	Register Revision Number (Optional).		0x63
68	Register Type.		0x00
	Bit[2-0] Support Device -	SSTE32882	
	Bit[7-3] Reserved -	0	
69	[SSTE32882]: RC1 (MS Nibble) / RC0 (LS Nibble)	UNUSED	0x00
70	[SSTE32882]: RC3 (MS Nibble) / RC2 (LS Nibble) - Drive Strength, Command/Address.		0x50
	Bit 1, Bit 0. RC2/DA3,4 Value.-	RESERVED	
	Bit 3, Bit 2. RC2/DBA0,1 Value -	RESERVED	
	Bit 5, Bit 4. RC3/DA4,3 value, Command/Address A Outputs -	Moderate	
	Bit 7, Bit 6. RC3/DBA0,1 value, Command/Address B Outputs -	Moderate	
71	[SSTE32882]: RC5 (MS Nibble) / RC4 (LS Nibble) - Drive Strength, Control and Clock.		0x55
	Bit 1, Bit 0. RC4/DA3,4 Control Signals, A Outputs.-	Moderate	
	Bit 3, Bit 2. RC4/DBA0,1 Control Signals, B Outputs -	Moderate	
	Bit 5, Bit 4. RC5/DA4,3 value, Y1/Y1# and Y3/Y3# Clock Outputs -	Moderate	
	Bit 7, Bit 6. RC5/DBA0,1 value, Y0/Y0# and Y2/Y2# Clock Outputs -	Moderate	
72	[SSTE32882]: RC7 (MS Nibble) / RC6 (LS Nibble).	UNUSED	0x00
73	[SSTE32882]: RC9 (MS Nibble) / RC8 (LS Nibble).	UNUSED	0x00
74	[SSTE32882]: RC11 (MS Nibble) / RC10 (LS Nibble).	UNUSED	0x00
75	[SSTE32882]: RC13 (MS Nibble) / RC12 (LS Nibble).	UNUSED	0x00
76	[SSTE32882]: RC15 (MS Nibble) / RC14 (LS Nibble).	UNUSED	0x00
77-112	Module-Specific Section	UNUSED	0x00
113	Module-Specific Section.	UNUSED	0x00
114-116	Module-Specific Section	UNUSED	0x00
117	Module Manufacturer ID Code, Least Significant Byte		0x80
118	Module Manufacturer ID Code, Most Significant Byte		0xCE
119	Module Manufacturing Location		0x01
120,121	Module Manufacturing Date	UNUSED	0x00
122-125	Module Serial Number	UNUSED	0x00
126	Cyclical Redundancy Code (CRC).	CRC	0x32
127	Cyclical Redundancy Code (CRC).	CRC	0xC7

128	Module Part Number	M	0x4D
129	Module Part Number	3	0x33
130	Module Part Number	9	0x39
131	Module Part Number	3	0x33
132	Module Part Number	B	0x42
133	Module Part Number	1	0x31
134	Module Part Number	K	0x4B
135	Module Part Number	7	0x37
136	Module Part Number	0	0x30
137	Module Part Number	D	0x44
138	Module Part Number	H	0x48
139	Module Part Number	0	0x30
140	Module Part Number	-	0x2D
141	Module Part Number	Y	0x59
142	Module Part Number	H	0x48
143	Module Part Number	9	0x39
144,145	Module Part Number		0x20
146,147	Module Revision Code	UNUSED	0x00
148	DRAM Manufacturer ID Code, Least Significant Byte		0x80
149	DRAM Manufacturer ID Code, Most Significant Byte		0xCE
150-175	Manufacturer's Specific Data	UNUSED	0x00
176-255	Open for customer use	UNUSED	0x00

Note: Serial Presence Detect shown for reference only. Bytes # 119 - 125, 146,147,150 - 255 value may vary.

DATARAM CORPORATION, USA Corporate Headquarters, P.O. Box 7528, Princeton, NJ 08543-7528;
Voice: 609-799-0071, Fax: 609-799-6734; www.dataram.com

All rights reserved.

The information contained in this document has been carefully checked and is believed to be reliable. However, Dataram assumes no responsibility for inaccuracies.

The information contained in this document does not convey any license under the copyrights, patent rights or trademarks claimed and owned by Dataram.

No part of this publication may be copied or reproduced in any form or by any means, or transferred to any third party without prior written consent of Dataram.